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Effects of construction projects schedule overruns: A case of the Gauteng Province, South Africa

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Abstract

Construction schedule overruns are not uncommon on construction projects world over and the South African construction industry has not escaped the challenges of failing to deliver projects on time. In order to find mitigation measures of schedule overruns, the first step is to identify the causes of these overruns. This paper assesses the effects of construction projects schedule overruns in the Gauteng – South African construction industry. The data used in this paper were derived from both primary and secondary sources. The secondary data was collected via a detailed review of related literature. The primary data was collected through a well-structured questionnaire which was distributed to construction professionals, who include: Architects, quantity surveyors, civil engineers, construction mangers and project managers. Out of the 200 questionnaires sent out, 146 were received back representing a 73% response rate. Data received from the questionnaires was analysed using descriptive statistics procedures. Findings from the study revealed that extension of time, cost overruns, loss of profit, disputes, poor quality of work due to hurrying the project, creates stress to the client, acceleration losses, bad reputation with contraction team, claims and delay in getting profit by the client were the major effects of construction projects schedule overruns in Gauteng, South Africa. The study contributes to the body of knowledge on the subject of the effects of construction project schedule overruns in Gauteng, South Africa.

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Keywords: Schedule overruns; Construction projects; Construction industry; Gauteng; South Africa

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1. Introduction

The problem of projects schedule overruns in the construction industry is a global phenomenon [1]. Alkhathami [2] defines schedule overruns as extra time required to finish a given construction project beyond its original planned duration, whether compensated for or not. Mohamad [3] says schedule overruns are an act or event that extends the time to complete or perform an act under the contract. Assaf and Al-Hejji [4] defined schedule overrun as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is basically a project slipping over its planned schedule and is considered as common problem in construction projects worldwide. Delivering projects within the contract stipulated time is one of the yield sticks of measuring a successful project. Despite its proven importance it is not uncommon to see construction projects failing to achieve their objectives [5]. However, construction projects schedule overruns have negative impacts to all construction parties including the client; hence the objective of this paper is to identify the effects of construction schedule overruns on construction projects in the Gauteng province of South Africa. .

2. Construction schedule overruns – Effects

Effects of schedule overruns are the consequences that will occur when the causes of schedule overruns are not identified and worked on effectively. Pourrostam and Ismail [6] identify and rank the effects of construction project schedule overruns as follows:

I. Time overrun: When the stipulated completion time is pushed forward, the project is said to have experienced schedule overrun [7]. Schedule overrun refers to the late completion or late delivery, from the time specified or agreed by all parties of the construction project. The main causes for the schedule overrun are financial problems, late payments for the completed work and on-going work, change orders, organizational changes etc. [8].

II. Cost overrun: When a project is completed at a cost higher than what was budgeted, it is said to experience a budget overrun [7]. Kikwasi [9] identify critical factors that cause cost overruns in construction projects as changes in scope of work on site, incomplete design at the time of tender, contractual claims (extension of time with cost), lack of cost planning and monitoring of funds, delays in costing variations and additional works. These critical factors in turn are the delay factors. According to Pourroustam and Ismail [6] cost overruns can be traced back to "root causes" that are often associated with the preliminary phases, project planning or design, that such root causes include; poor estimation of quantities, design variations or errors, project schedule changes, scope changes, unexpected site conditions, rising costs of materials and labour (largely due to inflation), and or unforeseen events. Pourroustam and Ismail [6] identify the following as the causes of cost overruns; increase in cost of labour, working force, materials and equipment and other factors. The main causes of the cost overrun are change orders, mistakes in the contract, changes in drawings etc. [8].

III. Dispute and Claims: Disputes and claims arise because of the losses incurred through schedule overruns [7]. Disputes normally come down in assessing three aspects of overruns: whose fault was it or who caused the overrun, how much delay occurred and, consequently, what monetary awards should be made [10]. The Critical Path Method is primarily useful in addressing the second of these conditions and in some cases can be used to assist in determining at least a portion of the monetary awards [10]. The main causes of disputes are slow or late payments for completed or ongoing work, client interference, neighbor issues, change in requirements, distribution of work, less communication within parties, subcontractor issues etc. [8].

IV. Arbitration: Sunjka and Jacob [7] states that projects would have extra costs and time consequences related to the engagement of professional arbitrators in cases of disputes that go through arbitration.

V. Litigation: Disputes, due to schedule overruns, can lead to court cases for resolution especially when large penalties are at stake [7]. Haseeb et al [8] defines litigation as negotiations and going to court to solve the problems

and it takes a long time to solve the problems. The main causes are late or no payments for completed work or on-going work and change orders [8].

VI. Total project abandonment: schedule overruns in project execution could lead to total abandonment if issues leading to the overruns are not resolved timeously [7]. The study of Haseeb et al [8] refers to the total abandonment of the construction project as stopping every work or suspending the project for a long time. The main causes of abandonment are organizational changes, regulatory changes, finances and payments and natural disasters. Many large construction projects are temporarily or permanently abandoned due to financial crisis, natural disasters and organizational changes [8].

These findings are in general agreement with the studies done by Aibinu and Jagboro [11] and Motaleb and Kishk [12]. However, Denini [13] identified thirteen effects that come with schedule overruns, these include: cost overrun; time overrun; contractual disputes; decrease in the owner's financial commitment; acceleration; claims; reduction in quality; negative social impacts; reduction in safety; litigation; arbitration; contract termination and total project abandonment. Saleh, Abdelnaser and Abdul [14] write that construction schedule overruns have the following Impacts on construction projects: loss of interest by the stakeholder; blacklist by authorities; waste of money and time and declination of reputation.

Further, [7] identified a total of eight effects of schedule overruns and tabulated them as follows; Time overrun: When the stipulated completion time is pushed forward, the project is said to have experienced time overrun; Budget overrun: When a project is completed at a cost higher than what was budgeted, it is said to experience a budget overrun; Poor quality completed project: inferior workmanship and or inferior quality materials, can lead to issues of project quality; Bad Public Relations: When projects are delayed, contractors, consultants and clients could put their public reputations at risk; Litigation: Disputes can lead to court cases for resolution especially when large penalties are at stake; Arbitration: The project will have extra cost and time related to the engagement of professional arbitrators; disputes and claims: Disputes and claims arise from the losses incurred through delays by either party in the contract; and total abandonment: Delays in project execution could lead to total abandonment if issues leading to the delays are not resolved timeously.

Kikwasi [9] identified fourteen effects of delays in Tanzania and ranked them as follows; time overrun, cost overrun, negative social impact, idling resources, disputes, arbitration, delaying by the client to return the loans, poor quality of work due to hurrying the projects, delaying in getting profit by clients, bankruptcy, litigation, create stress on contractors, total abandonment and acceleration losses.

3. Research Methodology

The data used in this paper were derived from both primary and secondary sources. The primary data was obtained through the survey method, while the secondary data was derived from the review of literature and archival records. The primary data was obtained through the use of a structured questionnaire survey. This was distributed to a total of 200 construction professionals that included; Architects, quantity surveyors, civil engineers, construction mangers and project managers who are currently involved in construction works in Gauteng, South Africa. This yardstick was considered vital for the survey in order to have a true reflection of the effects of construction project schedule overruns.

All professionals in Gauteng province had an equal chance to be drawn and participate in the survey. Out of the 200 questionnaires sent out, 146 were received back representing a 73% response rate. This was considered adequate for the analysis based on the assertion by [15] that the result of a survey could be considered as biased and of little value if the return rate was lower than 30–40%. The data presentation and analysis made use of frequency distributions and percentages of all the respondents.

3.1 Mean Item Score (MIS)

A five point Likert scale was used to determine the causes of construction project cost overruns in Gauteng province with regards to the identified factors from the reviewed literature. The adopted scales was as follows:

1 = Extremely unlikely
2 = Unlikely
3 = Neutral
4 = likely
5 = Extremely likely

The five-point scale was transformed to mean item score (MIS) for each of the factors of causes of cost overruns as assessed by the respondents. The indices were then used to determine the rank of each item. The ranking made it possible to cross compare the relative importance of the items as perceived by the respondents. This method was used to analyse the data collected from the questionnaires survey. The mean item score (MIS) was calculated for each item as follows;

$$MIS = \frac{1n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{\sum N} \qquad \text{Equation 1.0}$$

Where;
n1 = Number of respondents for extremely unlikely;
n2 = Number of respondents for unlikely;
n3 = Number of respondents for neutral;
n4 = Number of respondents for likely;
n5 = Number of respondents for extremely likely;
N = Total number of respondents

After mathematical computations, the factors were then ranked in descending order of their mean item score (from the highest to the lowest).

4. Findings and Discussion

Findings from the 146 usable questionnaires revealed that 59.6% of the respondents were male and 40.4% were female. Findings relating to the respondents' age group revealed that 29.5% of the respondents were in the age group of 20-25 years old, 26.7% of the respondents were in the age group 26-30 years old, 17.1% were in the age group 31-35 years old, 11.6% were in the age group 36-40 years old, 6.2% of the respondents were in the age group 41-45 years old, 4.1% were in the age group 46-50 years old, 3.4% of the respondents were above 50 years old and 1.4% of the respondents were between 51-55 years old. Further, results showed that 76.7% of the respondents were Black, 14.4% were White, 4.8% were either Indian or Asian and 4.1% of the respondents were Coloured. Findings relating to respondent's work professional qualification, results showed that 38.4% were quantity surveyors, 20.5% were civil engineers, 11% were project managers, 10.3% were construction managers, 8.9% were construction project managers, 5.5% were architects and 5.5% selected others, which included an artisan, a building inspector, electrical contractors, a safety consultant and a site agent.

Furthermore, results revealed that 56.8% of the respondents had experience that ranged from 1-5 years, 20.5% had experience in the range of 6-10 years, 11.6% had experience that ranged between 11-15 years, 6.2% had more than 20 years' experience and 4.8% had experience that ranged from 16-20 years in the construction industry. Further, 46.6% of the respondents had bachelor's degrees, 32.2% had diplomas, 12.3% of the respondents had masters degrees, 4.1% of the respondents had doctorate degrees and 4.8% of the respondents only had metric (grade 12) certificates. Furthermore, it was revealed that 35.6% of the respondents were employees of contractors, 34.9%

of the respondents were employees of consultants and 20.5% were government employee, 8.2% were employed by clients and 0.7% of the respondents were self-employed.

4.1 Effects of construction projects schedule overruns

The respondents were asked to rank the effects of construction projects schedule overruns in Gauteng, the results obtained included the follows: extension of time (SD=0.829; $\bar{x}$=4.33; R=1), cost overruns (SD=0.846; $\bar{x}$=4.33; R=1), loss of profit (SD=0.939; $\bar{x}$=4.16; R=2), disputes (SD=0.831; $\bar{x}$=4.11; R=3), poor quality of work due to hurrying the project (SD=0.837; $\bar{x}$=4.10; R=4), creates stress to the client (SD=0.931; $\bar{x}$=4.01; R=5), acceleration losses (SD=0.826; $\bar{x}$=3.98; R=6), bad reputation with contraction team (SD=0.944; $\bar{x}$=3.96; R=7), claims (SD=0.974; $\bar{x}$=3.96; R=8) and delay in getting profit by the client (SD=0.884; $\bar{x}$=3.92; R=9) were the top ten effect of construction projects effects in Gauteng. The findings were similar to the results in the studies by [7,11,12,6] where time overrun and cost overruns was identified as the major effects of construction projects schedule overruns.

Table 1: Effects of construction projects schedule overruns

EFFECTS OF SCHEDULE OVERRUNS	σX	$\bar{x}$	R
Extension of time	0.829	4.33	1
Cost overruns	0.846	4.33	1
Loss of profit	0.939	4.16	2
Disputes	0.831	4.11	3
Poor quality of work due to hurrying the project	0.837	4.10	4
Creates stress to the client	0.931	4.01	5
Acceleration losses	0.826	3.98	6
Bad reputation with contraction team	0.944	3.96	7
Claims	0.974	3.95	8
Delay in getting profit by the client	0.884	3.92	9
Creates stress on the contractor	0.949	3.92	9
Delaying the client to repay back bank loans	0.995	3.90	10
Bad reputation with client	1.008	3.89	11
Termination of contracts	1.075	3.83	12
Arbitration	0.875	3.81	13
Bankruptcy of the client	1.050	3.80	14
Idling resources	0.877	3.71	15
Litigation	0.994	3.70	16
Total project abandonment	1.075	3.70	16
Loss of skilled employees	1.077	3.69	17

5. Conclusion and Recommendation

Literature revealed that there are various effects of construction projects schedule overruns. Time overrun (extension of time), cost overrun, disputes, arbitration, litigation, total abandonment and claims were identified as the effects of construction schedule overruns from literature. From the questionnaire survey obtained from the respondents, it was revealed that extension of time, cost overruns, loss of profit, disputes, poor quality of work due to hurrying the project, creates stress to the client, acceleration losses, bad reputation with contraction team, claims and delay in getting profit by the client were the top ten identified effects of construction projects cost overruns in Gauteng, South Africa. It is therefore recommended that all members of construction teams should be trained and educated on schedule overruns in order to minimise these overruns.

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